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## (54) Less Irritative detergent composition

(57) A detergent composition comprising a sulfosuccinate surfactant and a hydroxysulfobetaine surfactant at a specific ratio is disclosed. A detergent composition comprising a sulfosuccinate surfactant, a hydroxysulfobetaine surfactant and a silicone derivative is also disclosed. These detergent compositions show good foaming properties, a high detergency, excellent effects of solubilizing, stably emulsifying and stably dispersing oily components, give a good texture, for example, to the skin and hair during and after washing and has a low irritativeness.

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## LESS IRRITATIVE DETERGENT COMPOSITION

### FIELD OF THE INVENTION

This invention relates to a less irritative detergent composition. More particularly, it relates to a detergent composition comprising a sulfosuccinate surfactant and a hydroxysulfobetaine surfactant, which shows good foaming properties, a high detergency, excellent effects of solubilizing and stably emulsifying and dispersing oily components, gives a good texture to, for example, the skin and hair during and after washing and has a low irritativeness.

### BACKGROUND OF THE INVENTION

There have been widely used anionic surfactants (for example, alkyl sulfate ester salts, polyoxyethylene alkyl sulfate ester salts, alkyl benzenesulfonates,  $\alpha$ -olefin-sulfonates) as a detergent. However these surfactants irritate the skin in a certain extent and thus cause chapped skin when continuously used.

In contrast to these anionic surfactants, it has been known that sulfosuccinate surfactants are extremely mild to the skin. However these surfactants have been scarcely employed as a main surfactant in a detergent, since they are poor in foaming properties and thickening properties. Namely, they are usually employed merely as an additive. For example, JP-B-56-43276 discloses the combined use of a conventional imidazoline amphotolytic surfactant, an alkyl

betaine amphotolytic surfactant and an N-acyl amino acid salt anionic surfactant, while JP-A-49-99104 discloses a shampoo composition comprising a sulfosuccinate surfactant with a betaine surfactant. The term "JP-A" as used herein means an "unexamined published Japanese patent application" whereas the term "JP-B" as used herein means an "examined Japanese patent publication".

Further, JP-B-62-43479 discloses a detergent composition comprising an ammonium sulfate salt of a secondary alcohol ethoxylate, a sulfosuccinic half ester salt of a secondary alcohol ethoxylate and an alkyl alkanol amide and/or an alkylamine oxide. Furthermore, detergent compositions or shampoo compositions comprising a sulfosuccinate surfactant together with other components are disclosed in JP-A-56-38395, JP-A-56-82895, JP-A-56-82897, JP-A-56-82898, JP-A-57-159897, JP-A-59-102996, JP-A-60-146864, JP-A-61-140514, JP-A-62-109897, JP-A-62-127396, JP-A-62-148599, JP-A-62-164797, JP-A-62-260893 and JP-A-63-161098.

Although these references show detergent compositions comprising a sulfosuccinate surfactant, none of them discloses a detergent composition wherein the low irritativeness characteristic of the sulfosuccinate surfactant is fully utilized while simultaneously satisfying other requirements including good foaming properties, high detergency, good thickening properties, high smoothness and

flexibility during and after washing and conditioning effects.

On the other hand, there have been well known detergent compositions to which a cationic polymer is added in order to improve the feeling during washing and to enhance the conditioning effects after washing. However the use of such an additive brings about some troubles. Specifically, when a cationic polymer is added in such an amount as to fully exert the aforesaid effects, an unpleasant stickiness is observed during the drying process. Furthermore, a complex of the cationic polymer would solidify and thus cause a stiff texture, as the drying proceeds.

There have been commonly attempted, furthermore, to use a sulfosuccinate surfactant together with an oily component (for example, lanolins, ester oils, hydrocarbons, silicones) as a conditioning agent. For example, JP-A-62-84198 discloses a liquid detergent comprising a sulfosuccinate surfactant together with a silicone derivative. However there is a problem that a sulfosuccinate surfactant employed alone is poor in the ability of solubilizing, stably emulsifying and stably dispersing such an oily component and thus deteriorates the foaming properties, detergency and stability during storage.

In order to solve these problems, alkyl alkanolamides and alkylamine oxides have been used together with sulfosuccinate surfactants. When such a surfactant is used in an

amount sufficient for fully achieving the aimed effects, however, another problem such as stretched feel of the skin after drying would arise.

Therefore it has been urgently required to develop a detergent composition, wherein the low irritativeness characteristic of a sulfosuccinate surfactant is fully utilized while simultaneously satisfying other requirements including good foaming properties, high detergency, thickening properties, effects of solubilizing and stably emulsifying and dispersing oily components, a smooth texture during and after washing and a high flexibility, without giving any stretched feel to the skin after drying.

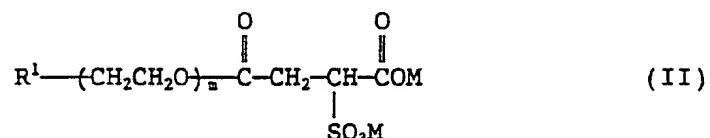
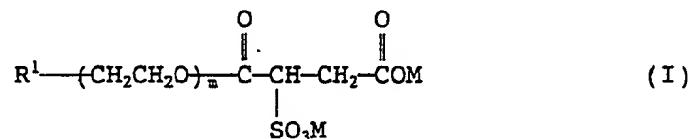
#### SUMMARY OF THE INVENTION

Under these circumstances, the present inventors have conducted extensive studies on a detergent composition comprising a sulfosuccinate surfactant in order to solve the aforesaid problems. As a result, they found that a detergent composition, which shows good foaming properties and excellent effects of solubilizing and stably emulsifying and dispersing oily components such as ester oils, lanolins and silicones and has a good feel, without affecting the low irritating characteristic of a sulfosuccinate surfactant, can be obtained by blending a specific sulfosuccinate surfactant with a hydroxysulfobetaine surfactant at a specific ratio. Further, they found that a detergent composition, which shows a low irritativeness, good foaming properties and excellent

effects of solubilizing and stably emulsifying and dispersing oily components such as ester oils and lanolins and has a good feel, can also be obtained by blending a specific sulfosuccinate surfactant with a hydroxysulfobetaine surfactant and a silicone derivative. The present invention was attained these findings.

Accordingly, the present invention provides a detergent composition comprising the following Components (A) and (B):

(A) from 1 to 50 % by weight, based on the total weight of the composition, of one or more sulfosuccinate surfactants represented by the following general formula (I) or (II):

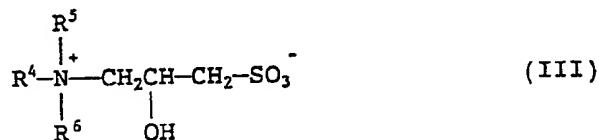


wherein R<sup>1</sup> represents an R<sup>2</sup>-O- or R<sup>3</sup>-C-NH- group in which R<sup>2</sup> represents a straight-chain or branched alkyl group or alkenyl group having 8 to 22 carbon

atoms and R<sup>3</sup> represents a straight-chain or branched alkyl or alkenyl group having 7 to 21 carbon atoms; M represents a hydrogen atom or a cation capable of forming a water soluble salt selected from among alkali metals, alkaline earth metals, an ammonium group and organic ammonium groups; and m is a number of from 0 to 20;

(B) from 0.1 to 12 % by weight, based on the total weight of the composition, of one or more hydroxysulfobetaine surfactants represented by the following general formula

(III):



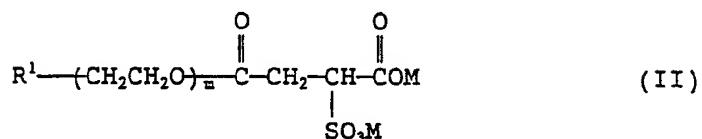
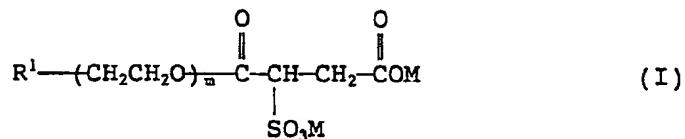
wherein R<sup>4</sup> represents a straight-chain or branched alkyl or alkenyl group having 8 to 18 carbon atoms; and

R<sup>5</sup> and R<sup>6</sup>, which may be the same or different, each represents a methyl group, an ethyl group or a hydroxyethyl group;

wherein the blending ratio by mol of Component (A) to Component (B) is from 1/25 to less than 1/4.

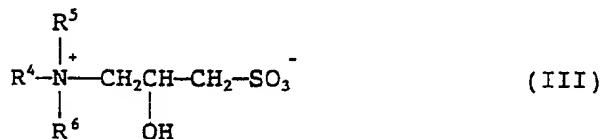
As another embodiment, the present invention further provides a detergent composition comprising the following Components (A), (B) and (C):

(A) one or more sulfosuccinate surfactants  
represented by the following general formula (I) or (II):



wherein  $\text{R}^1$ , M and m are as defined above;

(B) one or more hydroxysulfobetaine surfactants  
represented by the following general formula (III):



wherein  $\text{R}^4$ ,  $\text{R}^5$  and  $\text{R}^6$  are as defined above; and

(C) one or more silicone derivatives.

#### DETAILED DESCRIPTION OF THE INVENTION

The sulfosuccinate surfactant of Component (A) to be used in the detergent composition of the present invention is selected from among sulfosuccinates of higher alcohols or ethoxylates thereof and sulfosuccinates derived from higher fatty acid amides and salts of these succinic esters, as represented by the above general formulae (I) and (II).

Among compounds represented by the above general formulae (I) and (II), examples of sulfosuccinates of higher alcohols or ethoxylates thereof include disodium salt of sulfosuccinates of a secondary alcohol ethoxylate having 11 to 13 carbon atoms (e.g., Softanol MES 3, 5, 7, 9 and 12 (each number shows the average mole number of added ethylene oxide (EO)), trade names, a product manufactured by Nippon Shokubai Kagaku Kogyo Co., Ltd.), disodium salt of sulfosuccinate of lauryl alcohol or a lauryl alcohol ethoxylate (EO = 3, 4, 6, 9 and 12) (e.g., Kohacool L-400, trade name, a product manufactured by Toho Chemical Industry Co., Ltd.), disodium salt of sulfosuccinates of a synthetic primary alcohol having 12 to 15 carbon atoms or an ethoxylate thereof (EO = 2 - 12) and disodium salt of sulfosuccinates of a Guerbet alcohol having 8 to 22 carbon atoms or an ethoxylate thereof (EO = 2 - 12). Examples of the sulfosuccinates derived from higher fatty acid amides include disodium salt of sulfosuccinates of a lauric acid polyethylene glycol (EO = 1, 2) amide, disodium salt of sulfosuccinates of an oleic acid polyethylene glycol (EO = 1, 2) amide and disodium salt of sulfosuccinates of a coconut oil fatty acid polyethylene glycol (EO = 4) amide. Among these compounds, sulfosuccinates of straight-chain higher alcohols having 11 to 13 carbon atoms or an ethoxylate thereof, or salts of these sulfosuccinates are preferable from the viewpoints of texture and foaming properties.

Either one of these sulfosuccinate surfactants or a mixture of two or more of them may be used as Component (A) of the detergent composition of the present invention in an amount of from 1 to 50 % by weight base on the total weight of the composition. It may be preferably used in an amount of from 5 to 25 % by weight in the case of a shampoo while from 10 to 45 % by weight in the case of a skin detergent. When the content of Component (A) is less than 1 % by weight, the effects of the present invention cannot be fully achieved. When it exceeds 50 % by weight, on the other hand, the handling of the obtained composition becomes difficult.

The hydroxysulfobetaine surfactant, i.e., Component (B) to be used in the detergent composition of the present invention may be selected from those represented by the above general formula (III). Among these compounds, those wherein each of R<sup>5</sup> and R<sup>6</sup> are a methyl group and R<sup>4</sup> is a lauryl or a myristyl group (namely, lauryldimethyl hydroxysulfobetaine or myristyldimethyl hydroxysulfobetaine) are particularly preferable.

These hydroxysulfobetaine surfactants may be desalted prior to the use in some cases.

Either one of these hydroxysulfobetaine surfactants or a mixture of two or more of them may be used as Component (B) in the detergent composition of the present invention in an amount of from 0.1 to 12 % by weight based on the total weight of the composition. It may be preferably used in an

amount of from 1 to 6 % by weight in the case of a shampoo and from 2 to 10 % by weight in the case of a skin detergent. When the content of Component (B) is less than 0.1 % by weight, the effects of the present invention cannot be fully achieved. When it exceeds 12 % by weight, on the other hand, the texture and foam qualities are deteriorated.

In the detergent composition of the present invention, the aforesaid sulfosuccinate surfactant (A) and hydroxysulfobetaine surfactant (B) may be blended at a ratio by mol ((B)/(A)) of from 1/25 to less than 1/4. When the blending ratio (B)/(A) is less than 1/25, the effects of the present invention cannot be fully achieved. When (B)/(A) is 1/4 or more, on the other hand, the texture and foam qualities are deteriorated.

Examples of the silicone derivative which can be used as Component (C) in another embodiment of the detergent composition of the present invention include dimethyl polysiloxanes, methylphenyl polysiloxanes, amino-denatured silicones, fatty acid-denatured silicones, alcohol-denatured silicones, aliphatic alcohol-denatured silicones, polyether-denatured silicones, epoxy-denatured silicones, fluorine-denatured silicones, cyclic silicones and alkyl-denatured silicones. These silicone derivatives may be in the form of either a monomer or a latex composition obtained by emulsion polymerization in accordance with the method described, for example, in JP-B-56-38609.

Among these silicone derivatives, dimethyl polysiloxanes (degree of polymerization: 500 or above), polyether-denatured silicones, amino-denatured silicones and cyclic silicones are particularly preferable from the viewpoint of imparting a good feel.

Either one of these silicone derivatives or a mixture of two or more of them may be used as Component (C) of the detergent composition of the present invention in an amount of from 0.01 to 100 % by weight, preferably from 0.02 to 5 % by weight, based on the total weight of the composition. When the content of Component (C) is excessively small, the effect of improving the feel to the hair or skin becomes unsatisfactory. When it largely exceeds 10 % by weight, on the other hand, the foaming properties and detergency are undesirably deteriorated.

The pH value of the detergent composition of the present invention may be preferably adjusted to 3 to 10, more preferably 4 to 8, with the use of a known acidic or alkaline agent commonly used in detergent compositions.

In addition to the aforesaid main components, the detergent composition of the present invention may arbitrarily contain ingredients commonly employed in detergents, for example, supplementary surfactants (e.g., higher fatty acid salts, alkylamine oxides, fatty acid alkanolamides, alkyl polyglycosides, fatty acid alkanolamide esters, acylated isethionates, acylated amino acids such as

acylated taurates, sucrose fatty acid esters, maltitol fatty acid esters, alkylmaltitol ethers, alkyltrimethylols, alkylamidetrimethylols), texture improvers (e.g., squalene, lanolin, ester oils, perfluoropolyether), humectants (e.g., propylene glycol, glycerol, diethylene glycol monoethyl ether, sorbitol), viscosity-controlling agents (e.g., methyl cellulose, carboxyvinyl polymer, hydroxyethyl cellulose, cationized cellulose, polyoxyethylene glycol distearate, ethanol), pearling agents, perfumes, colorants, UV absorbers, antioxidants, bactericide (e.g., triclosan, trichlorocarban), antiinflammatory agents (e.g., potassium glycyrhetinate, tocopherol acetate), anti-dandruff agents (e.g., zinc pyrithione, octopirox), preservatives (e.g., methylparaben, butylparaben), as well as those listed in Encyclopedia of Shampoo Ingredients (Micelle press, 1985), so long as the effects of the present invention are not deteriorated thereby.

The detergent composition of the present invention may be applicable to various products including laundry detergents, dish detergents, skin detergents and hair shampoos. These compositions may be formulated into any form conveniently used as a detergent. In this case, the total content of the sulfosuccinate surfactant and hydroxysulfo-betaine surfactant in the whole composition may be preferably 30 % by weight or more (in the case of a solid product), 20 %

by weight or more (in the case of a paste product) or 10 % by weight or more (in the case of a liquid product).

According to the less irritative detergent composition of the present invention, the disadvantages of sulfosuccinate surfactants (namely, poor foaming characteristics including foaming property, low detergency, poor ability of solubilizing, stably emulsifying and stably dispersing oily components and undesirable feel during and washing) are improved. Thus it may be advantageously used as a detergent which should scarcely irritate the skin or mucosae, for example, shampoo and skin detergent for infants, skin detergent, wool detergent and dish detergent for housewives whose hands are liable to be chapped and daily shampoo for those who shampoo every day.

To further illustrate the present invention, and not by way of limitation, the following Examples will be given.

#### EXAMPLE 1

Detergent compositions (pH 7) as specified in Table 1 were produced and the foaming properties, foam qualities, smoothness of the hair, stretched feel of the skin and ability of solubilizing, stably emulsifying and stably dispersing of each product were evaluated. Table 1 summarizes the results.

The aforesaid items were evaluated each in the following method according to the criteria as specified below.

(Foaming properties)

A human hair bundle (20 cm in length, 20 g in weight) was moistened with water at 40°C and then 1 g of each detergent composition was uniformly applied thereto. After foaming for 1 minute, the foaming properties were evaluated with the naked eye based on the following criteria.

A: Very good

B: Moderate

C: Somewhat poor

D: Poor

(Foaming qualities)

Foaming was performed in the same manner as the one described above and the qualities of the resulting foam were evaluated based on the following criteria.

A: Creamy and very velvety

B: Creamy and velvety

C: Somewhat rough and not velvety

D: Rough and not velvety

(Smoothness of the hair)

After foaming in the same manner as the one described above, the hair was rinsed with running water and then the smoothness of the hair was evaluated based on the following criteria.

A: Very smooth

B: Somewhat tangled

C: Seriously tangled

(Stretched feel of the skin)

Each detergent composition was diluted with an appropriate amount of water. The face was washed therewith and dried, and then the stretched feel of the skin was evaluated based on the following criteria.

A: Moist and not stretched

B: Somewhat stretched

C: Seriously stretched

(Ability of solubilizing, stably emulsifying and dispersing)

Each detergent composition was filled in a glass bottle and stored at room temperature for 1 week. Then the ability of solubilizing, stably emulsifying and stably dispersing was evaluated with the naked eye based on the following criteria.

A: Stable

B: Heterogeneous or separated out

TABLE 1

Component (A)	Product of the Invention					Comparative product					
	1	2	3	4	5	1	2	3	4	5	6
Disodium polyoxyethylene (2) lauryl sulfosuccinate	21	21	-	-	21	21	21	-	-	16	-
Disodium polyoxyethylene (5) lauroyl ethanolamide sulfosuccinate	-	-	21	21	-	-	-	21	21	-	21
Component (B)											
Lauryldimethyl hydroxy- sulfobetaine	3	-	3	-	1	-	-	-	-	8	-
Myristyldimethyl hydroxy- sulfobetaine	-	3	-	3	-	-	-	-	-	21	-
Lauryldimethylaminoacetic acid betaine	-	-	-	-	-	-	-	3	-	-	-
Lauryldimethyl sulfobetaine	-	-	-	-	-	-	3	-	-	-	-
Lauric acid diethanolamide	-	-	-	-	-	-	-	-	3	-	-
Liquid lanolin	0.5	-	0.5	-	-	0.5	0.5	-	-	0.5	-
Limonene	-	1.0	-	1.0	1.0	-	-	1.0	1.0	1.0	-
Water	balance	balance	balance	balance	balance	balance	balance	balance	balance	balance	balance
(B) / (A) ratio (by mol)	0.20	0.19	0.24	0.23	0.07	-	-	-	0.71	-	0.33

TABLE 1 (cont'd.)

		Product of the Invention					Comparative product						
		1	2	3	4	5	1	2	3	4	5	6	7
Foaming properties	A	A	A	A	A	C	A	B	B	A	C	A	
Foam qualities	A	A	A	A	A	C	C	C	C	C	C	C	
Smoothness of the hair	A	A	A	A	A	B	C	C	B	C	C	B	
Stretched feel of the skin	A	A	A	A	A	B	C	C	B	C	C	C	
Ability of solubilizing and stably emulsifying and dispersing	A	A	A	A	A	B	A	A	A	A	B	A	

Note: All numerical values given above, except for (B)/(A) ratio, are % by weight based on the total weight of the composition.

As Table 1 shows, the detergent compositions of the present invention were excellent in foaming properties and showed a good feel and a high stability.

EXAMPLE 2

Product of the Invention 4 obtained in Example 1 and Comparative Product 8 of the following composition were organoleptically evaluated by a pair test by 10 skilled panelists. Table 2 shows the results.

(Composition of Comparative Product 8)	(% by weight)
(1) Disodium polyoxyethylene (5) lauroyl ethanalamide sulfosuccinate (Component (A))	21
(2) Myristyldimethyl hydroxysulfobetaine (Component (B))	4
(3) Limonene	1.0
(4) Water	balance
(B)/(A) ratio (by mol)	0.25

TABLE 2

	Preferring Product of <u>Invention 4</u>	Giving similar evaluation	Preferring Comparative Product 8
Total evaluation	6	2	2
Foam qualities	5	3	2
Smoothness of the hair	7	2	1
Stretched feel of the skin	4	4	2

Note: All values given above are number of panelists.

EXAMPLES 3 TO 5

A shampoo, a light laundry detergent and a dish detergent, each having the composition as specified below, were produced. Each of these products showed a low irritativeness, excellent foaming properties, a high detergency, a good feel and a high stability.

EXAMPLE 3

Shampoo:	(% by weight)
(1) Disodium polyoxyethylene (5) lauryl sulfosuccinate (Component (A))	20
(2) Lauryldimethyl hydroxysulfobetaine (Component (B))	2
(3) Coconut oil fatty acid amide propyl-betaine (Component (B))	1
(4) Cationized cellulose (Polymer JR400; trade name, a product manufactured by UCC Co.)	0.15
(5) Perfume	0.5
(6) Colorant	appropriate amount
(7) Purified water	balance
(B)/(A) ratio (by mol)	0.18

EXAMPLE 4

Light laundry detergent:	(% by weight)
(1) Disodium polyoxyethylene (7) alkyl sulfosuccinate (Softanol MES 7H, trade name, a product manufactured by Nippon Shokubai Kagaku Kogyo Co., Ltd.) (Component (A))	20
(2) N-lauroyl-N'-carboxymethyl-N'-(2-hydroxyethyl)ethylenediamine NH <sub>3</sub> salt	10

(3)	Lauryldimethyl hydroxysulfobetaine (Component (B))	2
(4)	Methyl cellulose	0.3
(5)	Ethyl alcohol	8
(6)	Perfume	appropriate amount
(7)	Water	balance
	(B)/(A) ratio (by mol)	0.21

EXAMPLE 5

Dish detergent:		(% by weight)
(1)	Disodium polyoxyethylene (2) lauryl sulfosuccinate (Component (A))	10
(2)	Disodium polyoxyethylene (5) lauroyl ethanalamide sulfosuccinate (Component (A))	7
(3)	Myristyldimethyl hydroxysulfobetaine (Component (B))	2.5
(4)	Decyl polyglycoside (1.6)	2
(5)	Carboxyvinyl polymer (Carbopol 941, trade name, a product manufactured by Goodrich Co.)	0.5
(6)	Polyethylene glycol	0.5
(7)	Perfume, colorant	appropriate amount
(8)	Water	balance
	(B)/(A) ratio (by mol)	0.22

EXAMPLE 6

A face-washing foam of the following composition was produced. The obtained product showed good foaming

properties, a low irritativeness, a good feel to the skin and a high stability.

(% by weight)

(1) Disodium polyoxyethylene (3) coconut oil alkyl sulfosuccinate (Component (A))	26
(2) Coconut oil alkyldimethyl hydroxysulfo-betaaine (Component (B))	4
(3) Lauric acid	10
(4) Ethylene glycol distearate	4
(5) Merquat 550 (trade name, a product manufactured by MERCK & Co. Inc.)	0.2
(6) Polyether-denatured silicone (SH3775C, trade name, a product manufactured by Toray Silicone Co.)	0.1
(7) Perfume	0.3
(8) Purified water	balance
(B)/(A) ratio (by mol)	0.24

EXAMPLES 7 and 8

Anti-dandruff shampoos of the following compositions were produced. Each of these products showed excellent foaming properties, a high anti-dandruff effect and a good feel.

EXAMPLE 7

Anti-dandruff shampoo:	(% by weight)
(1) Disodium polyoxyethylene (2) lauryl sulfosuccinate (Component (A))	20
(2) Lauryl hydroxysulfobetaine (Component (B))	2
(3) Lauric acid TEA salt	3

(4)	Sodium N-lauroyl-N-methyltaurine	3
(5)	Polyoxyethylene sorbitan monolaurate (20 E.O.) (Tween 20, trade name, a product manufactured by ICI Americas, Ltd.)	1
(6)	Cetanol	0.5
(7)	Perfluoropolyether (FOMBLIN HC/25, trade name, a product manufactured by Montefluos)	0.1
(8)	Octopirox	0.5
(9)	Diethylene glycol monoethyl ether	3
(10)	Perfume, colorant	appropriate amount
(11)	Water	balance
	(B)/(A) ratio (by mol)	0.14

EXAMPLE 8

Anti-dandruff shampoo:		(% by weight)
(1)	Disodium polyoxyethylene (5) lauryl sulfosuccinate (Component (A))	23
(2)	Lauryldimethyl hydroxysulfobetaine (Component (B))	3
(3)	3-(N-lauroylaminoethyl-N-hydroxyethyl)- amino-2-hydroxy-1-propanesulfonic acid TEA salt	3
(4)	Isopropyl palmitate	0.5
(5)	Lauryldimethylamine oxide	1
(6)	Cationized guar gum (Jagual C-13-S, trade name, a product manufactured by Cellanease Stein-Hohl Co.)	0.2
(7)	Stearyltrimethylammonium chloride	0.1
(8)	Polyvinyl alcohol	0.5
(9)	Zinc pyrithione	0.8
		appropriate

(10) Perfume, colorant	amount
(11) Water	balance
(B)/(A) ratio (by mol)	0.23

EXAMPLE 9

Detergent compositions (pH 6) as specified in Table 3 were produced and the foaming properties, foam qualities, smoothness of the hair, stretched feel of the skin and ability of solubilizing, stably emulsifying and stably dispersing of each product were evaluated. Table 3 summarizes the results.

The aforesaid items were evaluated each in the following method according to the criteria as specified below.

(Foaming properties)

A human hair bundle (20 cm in length, 20 g in weight) was moistened with water at 40°C and then 1 g of each detergent composition was uniformly applied thereto. After foaming for 1 minute, the foaming properties were evaluated with the naked eye based on the following criteria.

A: Very good

B: Moderate

C: Somewhat poor

C: Poor

(Foaming qualities)

Foaming was performed in the same manner as the one described above and the qualities of the resulting foam were evaluated based on the following criteria.

- A: Creamy and very velvety
- B: Creamy and velvety
- C: Somewhat rough and not velvety
- D: Rough and not velvety

(Smoothness of the hair)

After foaming in the same manner as the one described above, the hair was rinsed with running water and then the smoothness of the hair was evaluated based on the following criteria.

- A: Very smooth
- B: Somewhat tangled
- C: Seriously tangled

(Stretched feel of the skin)

Each detergent composition was diluted with an appropriate amount of water. The face was washed therewith and dried, and then the stretched feel of the skin was evaluated based on the following criteria.

- A: Moist and not stretched
- B: Somewhat stretched
- C: Seriously stretched

(Ability of solubilizing, stably emulsifying and dispersing)

Each detergent composition was filled in a glass bottle and stored at room temperature for 1 week. Then the ability of solubilizing, stably emulsifying and stably dispersing was evaluated with the naked eye based on the following criteria.

A: Stable

B: Heterogeneous or separated out

TABLE 3

	Product of the Invention					Comparative Product
	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>	<u>6</u>
<u>Component (A)</u>						
Disodium polyoxyethylene (4) coconut oil alkyl sulfosuccinate	25	25	25	25	20	20
<u>Component (B)</u>						
Lauryldimethyl hydroxy- sulfobetaine	5	5	5	5	10	10
<u>Component (C)</u>						
Polyether-denatured silicone (DC Q2-5200, trade name, a product of Dow Corning Co.)	1.0	-	-	-	-	-
Polyether-denatured silicone (SH3775C, trade name, a product of Toray silicone Co.)	-	0.5	-	-	1.0	-
Amino-denatured silicone emulsion (SM8702C, trade name, a product of Toray silicone Co.)	-	-	2.0	-	-	-
Dimethyl polysiloxane (100,000 cs)	-	-	-	0.1	-	1.0
Polyethylene glycol distearate (180 E.O.)	2.0	2.0	2.0	2.0	2.0	2.0
Perfume	0.3	0.3	0.3	0.3	0.3	0.3
Water	balance	balance	balance	balance	balance	balance

TABLE 3 (cont'd)

	Product of the Invention						Comparative Product
	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>	<u>6</u>	<u>1</u>
Foaming properties	A	A	A	A	A	A	A
Foam qualities	A	A	A	A	A	A	C
Smoothness of the hair	A	A	A	A	A	A	C
Stretched feel of the skin	A	A	A	A	A	A	B
Ability of solubilizing and stabilizing emulsifying and dispersing	A	A	A	A	A	A	A

Note: All numerical values given above, except for (B)/(A) ratio, are % by weight based on the total weight of the composition.

As Table 3 shows, the detergent compositions of the present invention were excellent in foaming properties and showed a good feel and a high stability.

EXAMPLE 10

A shampoo of the following composition was produced. The obtained product showed a low irritativeness, good foaming properties, a high detergency, a good feel and a high stability.

	(* by weight)
(1) Disodium polyoxyethylene (5) lauryl sulfosuccinate	15
(2) Lauryldimethyl hydroxysulfobetaine	3
(3) Coconut oil fatty acid amide propylbetaine	2
(4) Polyether-denatured silicone (KF352(A); trade name, a product manufactured by The Shin-Etsu Chemical Co. Ltd.)	0.5
(5) Cationized cellulose (Polymer JR400; manufactured by UCC Co.)	0.15
(6) Dimethyl polysiloxane (100,000 cs)	0.05
(7) Perfume	0.5
(8) Colorant	appropriate amount
(9) Purified water	balance

EXAMPLE 11

A conditioning shampoo of the following composition was produced. The obtained product showed a low irritativeness, good foaming properties, an excellent conditioning effect, a good feel and a high stability.

(% by weight)

(1) Disodium polyoxyethylene (2) lauryl sulfosuccinate	20
(2) Lauryldimethyl hydroxysulfobetaine	2
(3) Glyceride monolaurate	2
(4) Cationized cellulose (Polymer JR400; trade name, a product manufactured by UCC Co.)	1
(5) Dimethyl polysiloxane (50,000 cs)	0.1
(6) Polyvinylpyrrolidone	0.1
(7) Mink oil	0.2
(8) Perfume, colorant	appropriate amount
(9) Water	balance

EXAMPLE 12

An aerosol shampoo of the following composition was produced.

The obtained detergent composition showed good foaming properties, a low irritativeness to the skin and eyes and an excellent feel.

(% by weight)

(1) Disodium polyoxyethylene (7) alkyl sulfo-succinate (Softanol MES 7H; trade name, a product manufactured by Nippon Shokubai Kagaku Kogyo Co., Ltd.)	5
(2) Myristyldimethyl hydroxysulfobetaine	0.5
(3) Coconut oil fatty acid methyltaurine sodium	1
(4) Hydroxypropylmethyl cellulose (2 % aqueous solution, viscosity: 4,000 cps)	0.5

(5)	Cationized cellulose (Polymer LR400, trade name, a product manufactured by UCC Co.)	0.1
(6)	Polyether-denatured silicone (SH3775C; trade name, a product manufactured by Toray Silicone Co.)	0.5
(7)	Ampholytic polymer (Yukaformer AM75W; trade name, a product manufactured by Mitsubishi Petrochemical Co., Ltd.)	0.1
(8)	Perfume	0.3
(9)	Liquefied petroleum gas	8
(10)	Water	balance

EXAMPLE 13

A shampoo having a rinse-effect of the following composition was produced. The obtained product was excellent in foaming properties, feel, conditioning effects and stability and showed a good rinse-effect.

(% by weight)

(1)	Disodium polyoxyethylene (4) lauryl sulfosuccinate	15
(2)	Lauryldimethyl hydroxysulfobetaine	8
(3)	N-lauroyl-N-(2-hydroxyethyl)-N',N'-bis(carboxymethyl)ethylenediamine TEA salt	3
(4)	Sodium stearoylactate	1
(5)	Cationized cellulose derivative (QUATRISOFT POLYMER LM-100; trade name, a product manufactured by Amerchol Co.)	0.5
(6)	2-decyldodecyltrimethylammonium chloride	0.5
(7)	Amino-denatured silicone emulsion (SM8702C; trade name, a product manufactured by Toray Silicone Co.)	2

(8)	Polyether-denatured silicone (SH3772C; trade name, a product manufactured by Toray Silicone Co.)	1
(9)	Dimethyl polysiloxane (100,000 cs)	0.1
(10)	Perfume, colorant, vegetable extract	appropriate amount
(11)	pH controlling agent (for adjusting to pH 6 - 7)	appropriate amount
(12)	Water	balance

EXAMPLE 14 and 15

A light laundry detergent and a dish detergent of the following compositions were produced. Each of the obtained product showed a low irritativeness, good foaming properties, a high detergency, a good feel and a high stability.

EXAMPLE 14

Light laundry detergent:	(% by weight)
(1) Disodium polyoxyethylene (7) alkyl sulfo- succinate (Softanol MES7H; trade name, a product manufactured by Nippon Shokubai Kagaku Kogyo, Co., Ltd.)	15
(2) N-lauryl-N'-carboxymethyl-N'-(2-hydroxyethyl) ethylenediamine NH <sub>3</sub> salt	10
(3) Lauryldimethyl hydroxysulfobetaine	5
(4) Methylphenyl polysiloxane (3000 cs)	0.3
(5) Methyl cellulose	0.3
(6) Ethyl alcohol	8
(7) Perfume	appropriate amount
(8) Water	balance

EXAMPLE 15

Dish detergent:	(% by weight)
(1) Disodium polyoxyethylene (2) lauryl sulfosuccinate	10
(2) Disodium polyoxyethylene (5) lauroyl ethanalamide sulfosuccinate	7
(3) Myristyldimethyl hydroxysulfobetaine	5
(4) Decyl polyglycoside (1.6)	5
(5) Cyclic dimethyl polysiloxane (KF996; trade name, a product manufactured by The Shin-Etsu Chemical Co., Ltd.)	0.5
(6) Carboxyvinyl polymer (Carbopol 941; trade name, a product manufactured by Goodrich Co.)	0.5
(7) Polyethylene glycol	0.5
(8) Perfume, colorant	appropriate amount
(9) Water	balance

EXAMPLE 16

A face-washing foam of the following composition was produced. The obtained product showed good foaming properties, a low irritativeness, a good feel to the skin and a high stability.

(% by weight)

(1) Disodium polyoxyethylene (3) coconut oil alkyl sulfosuccinate	26
(2) Coconut oil alkyldimethyl hydroxysulfobetaine	10
(3) Lauric acid	10
(4) Ethylene glycol distearate	4

(5)	Merquat 550 (trade name, a product manufactured by MERCK & Co. Inc.)	0.2
(6)	Polyether-denatured silicone (SH3775C; trade name, a product manufactured by Toray Silicone Co.)	1
(7)	Perfluoropolyether (FOMBLIN HC/25, trade name, a product manufactured by Montefluos)	0.2
(8)	Perfume	0.3
(9)	Purified water	balance

EXAMPLES 17 and 18

Anti-dandruff shampoos of the following compositions were produced. Each of these products showed excellent foaming properties, a high anti-dandruff effect and a good feel.

EXAMPLE 17

Anti-dandruff shampoo:		(% by weight)
(1)	Disodium polyoxyethylene (2) lauryl sulfosuccinate	20
(2)	Lauryl hydroxysulfobetaine	2
(3)	Lauric acid TEA salt	3
(4)	Sodium N-lauroyl-N-methyltaurine	3
(5)	Polyoxyethylene sorbitan monolaurate (20 E.O.) (Tween 20, trade name)	1
(6)	Cetanol	0.5
(7)	Dimethyl polysiloxane (350 cs)	0.6
(8)	Dimethyl polysiloxane rubber (20,000,000 cs)	0.4
(9)	Octopirox	0.5
(10)	Diethylene glycol monoethyl ether	3

(11) Perfume, colorant	appropriate amount
(12) Water	balance

EXAMPLE 18

Anti-dandruff shampoo:		(% by weight)
(1) Disodium polyoxyethylene (5) lauryl sulfosuccinate		20
(2) Lauryldimethyl hydroxysulfobetaine		5
(3) 3-(N-lauroylaminoethyl-N-hydroxyethyl)-amino-2-hydroxy-1-propanesulfonic acid TEA salt		3
(4) Amide ether sulfate (Genapol AMS-TEA; trade name, a product manufactured by Hoechst A.G.)		3
(5) Polyether-denatured silicone (SH37720; trade name, a product manufactured by Toray Silicone Co.)		1
(6) Cationized guar gum (Jagual C-13-S, trade name, a product manufactured by Cellanease Stein-Hohl Co.)		0.2
(7) Dimethyl polysiloxane (2,000,000 cs)		0.2
(8) Stearyltrimethylammonium chloride		0.1
(9) Polyvinyl alcohol		0.5
(10) Zinc pyrithione		0.8
(11) Perfume, colorant		appropriate amount
(12) Water		balance

EXAMPLE 19

A baby shampoo of the following composition was produced. The obtained product showed a low irritativeness,

excellent foaming properties, a good feel and a high stability.

(% by weight)

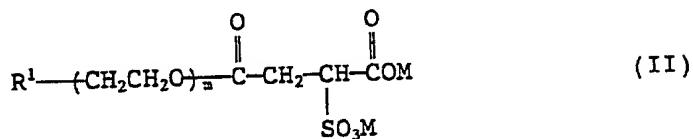
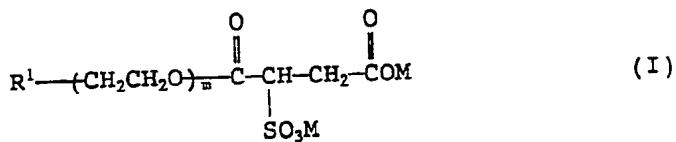
(1) Disodium polyoxypropylene (5) polyoxyethylene (4)-2-butyloctyl sulfosuccinate (Component (A))	8
(2) Myristyldimethyl hydroxylsulfobetaine (Component (B))	1
(3) Sucrose fatty acid ester	1
(4) Glyceride monolaurate (Sunsoft 750; manufactured by Taiyo Kagaku Co., Ltd.)	1
(5) Polyoxypropylene butyl ether phosphoric acid (20 P.O.)	0.5
(6) Amino-denatured silicone emulsion (DC929; trade name, a product manufactured by Dow Corning Co.)	0.4
(7) Cationized cellulose (Polymer LR30M; trade name, a product manufactured by UCC Co.)	0.05
(8) Hydrolyzed collagen	0.1
(9) Ethylene glycol monostearate	0.5
(10) Perfume, lactic acid, vegetable oil	appropriate amount
(11) Water	balance

While the invention has been described in detail and with reference to specific examples thereof, it will be apparent to one skilled in the art that various changes and modifications can be made therein without departing from the spirit and scope thereof.

CLAIMS:

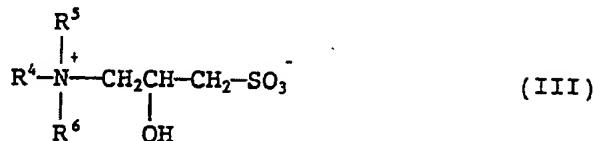
1. A detergent composition comprising the following components (A) and (B):

(A) from 1 to 50 % by weight of one or more sulfosuccinate surfactants represented by the following general formula (I) or (II):



wherein R<sup>1</sup> represents an R<sup>2</sup>-O- or R<sup>3</sup>-C-NH- group in which R<sup>2</sup> represents a straight-chain or branched alkyl group or alkenyl group having 8 to 22 carbon atoms and R<sup>3</sup> represents a straight-chain or branched alkyl or alkenyl group having 7 to 21 carbon atoms; M represents a hydrogen atom or a cation capable of forming a water soluble salt selected from among alkali metals, alkaline earth metals, an ammonium group and organic ammonium groups; and n is a number of from 0 to 20;

(B) from 0.1 to 12 % by weight of one or more hydroxysulfobetaine surfactants represented by the following general formula (III):



wherein  $\text{R}^4$  represents a straight-chain or branched alkyl or alkenyl group having 8 to 18 carbon atoms; and

$\text{R}^5$  and  $\text{R}^6$ , which may be the same or different, each represents a methyl group, an ethyl group or a hydroxyethyl group;

wherein the blending ratio by mol of Component (A) to Component (B) is from 1/25 to less than 1/4.

2. A detergent composition of claim 1, wherein said Component (A) is selected from among sulfosuccinates of higher alcohols or ethoxylates thereof and sulfosuccinates derived from higher fatty acid amides and salts of these sulfosuccinate.

3. A detergent composition of claim 1, wherein said Component (B) is selected from among lauryldimethyl hydroxysulfobetaine and myristyldimethyl hydroxysulfobetaine.

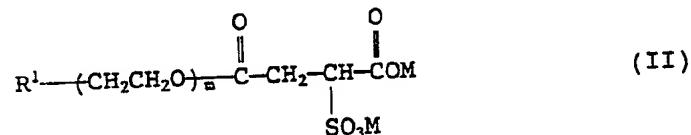
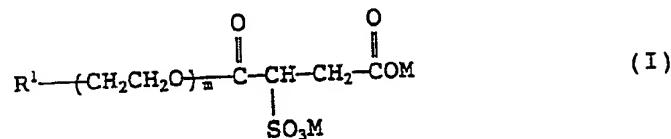
4. A detergent composition of claim 1, wherein said detergent composition is a shampoo composition, and said

Component (A) amounts from 5 to 25 % by weight and said Component (B) amounts from 1 to 6 % by weight.

5. A detergent composition of claim 1, wherein said detergent composition is a skin detergent, and said Component (A) amounts from 10 to 45 % by weight and said Component (B) amounts from 2 to 10 % by weight.

6. A detergent composition comprising the following components (A), (B) and (C):

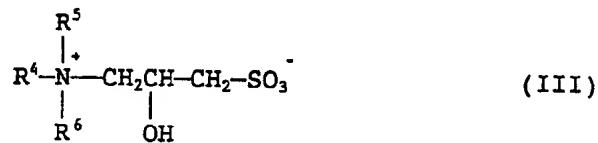
(A) one or more sulfosuccinate surfactants represented by the following general formula (I) or (II):



wherein R<sup>1</sup> represents an R<sup>2</sup>-O- or R<sup>3</sup>-C-NH- group in which R<sup>2</sup> represents a straight-chain or branched alkyl group or alkenyl group having 8 to 22 carbon atoms and R<sup>3</sup> represents a straight-chain or branched alkyl or alkenyl group having 7 to 21 carbon atoms; M represents a hydrogen atom or a cation capable of forming a water soluble salt selected from among

alkali metals, alkaline earth metals, an ammonium group and organic ammonium groups; and m is a number of from 0 to 20;

(B) one or more hydroxysulfobetaine surfactants represented by the following general formula (III):



wherein R<sup>4</sup> represents a straight-chain or branched alkyl or alkenyl group having 8 to 18 carbon atoms; and

R<sup>5</sup> and R<sup>6</sup>, which may be the same or different, each represents a methyl group, an ethyl group or a hydroxyethyl group; and

(C) one or more silicone derivatives.

7. A detergent composition of claim 6, wherein said Component (A) amounts from 1 to 50 % by weight, said Component (B) amounts from 0.1 to 12 % by weight and said Component (C) amounts from 0.01 to 10 % by weight.

8. A detergent composition of claim 6, wherein said Component (A) is selected from among sulfosuccinates of higher alcohols or ethoxylates thereof and sulfosuccinates derived from higher fatty acid amides and salts of these sulfosuccinates.

9. A detergent composition of claim 6, wherein said Component (B) is selected from among lauryldimethyl hydroxysulfobetaine and myristyldimethyl hydroxysulfobetaine.

10. A detergent composition of claim 6, wherein said Component (C) is selected from among dimethyl polysiloxanes, methylphenyl polysiloxanes, amino-denatured silicones, fatty acid-denatured silicones, alcohol-denatured silicones, aliphatic alcohol-denatured silicones, polyether-denatured silicones, epoxy-denatured silicones, fluorine-denatured silicones, cyclic silicones and alkyl-denatured silicones.

11. A detergent composition of claim 7, wherein said detergent composition is a shampoo composition, and said Component (A) amounts from 5 to 25 % by weight and said Component (B) amounts from 1 to 6 % by weight.

12. A detergent composition of claim 7, wherein said detergent composition is a skin detergent, and said Component (A) amounts from 10 to 45 % by weight and said Component (B) amounts from 2 to 10 % by weight.

13. A detergent composition of claim 7, wherein said Component (C) amounts from 0.02 to 5 % by weight.